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RESULTS OF FELLING EXPERIMENTS FOR CONTROL OF BLACK HILLS BEETLE BY PRODUCING UNFAVORABLE CONDITIONS FOR BROOD DEVELOPMENT

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1924

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425 Pp

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By
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Results of several years' girdling and trap tree experiments with various species of eastern trees and insects have indicated that very exact ~~experiments~~ requirements are necessary for brood development. The critical conditions were found to be variations in water content of the inner bark, excessive moisture or excessive drying proving fatal. This suggested the possibility that cutting infested trees so as to produce adverse conditions might likely be effective in the control of more aggressive western barkbeetles and if so make present operations both more economical and practical. Likewise there is a possibility of so treating living trees to form an attractive trap and at the same time produce conditions unfavorable for brood development.

The former of these possibilities was tested in a preliminary way in a series of experiments outlined for the Kaibab. Messrs. Edmonston and Hofer felled and treated the infested trees during May 1924. The final examinations were made by these men together with Messrs. Miller, Keen and the writer during the last week of August 1924.

The treatments were made in seven groups. In each case all the infested trees were treated so as to afford an additional check by means of any new infestation that developed surrounding them. The accompanying tables give the character of the tree, method of treatment and results.

At the time of treatment none of the trees had started to fade. On the first lot treated May 27 the young larvae were not over one half grown but by the last date June 9 quite a few had reached the prepupal stage.

Results.

Messrs. Edmonston and Hofer made several preliminary examinations during the summer but their results were not conclusive since they did not wish to disturb much bark surface at that time. Unfortunately the later examination was made too late as many logs were heavily infested by Ips and the exit hole of this insect could not be distinguished from that of Dendroctonus ponderosae. It was, therefore, impossible to tell what proportion of the emergence was D. ponderosae but it is certain that some of these holes, and possibly quite a large percentage, were this species. However, Mr. Edmonston's observations showed that the Black Hills beetles that did mature in these logs probably emerged early and sporadically and probably were not effective in concentrated attack. Whatever happened, of the seven groups treated, only one, F, showed a single newly infested tree in the surrounding timber and this was a follow-up of a last year's attack. An examination of three nearby groups treated during July by usual control methods showed new attacks as follows:

45 trees treated - 20 - 1924 attacks

18 " " - 7 - " "

13 " " - 3 - " "

On Greenland Plateau, worked in July, 91 new attacks were found by Edmonston and Hofer surrounding 317 treated trees. Control work done prior

to July 1st was much more effective. In many groups perfect results were obtained. On the basis of new attacks(which, however, is not absolute proof) these results are very encouraging. They were deemed sufficient to recommend further experimental control work on a large scale which is now being conducted by Mr. Keen and the Forest Service at Dry Park.

Sun-curing. This method involved the felling of the tree, cutting out the log of infested length, and trimming it of branches. After 15 days or more the log was turned 180 degrees. It produced absolutely perfect results and it should be given a very thorough trial in the 1925 control work. In fact, if practical difficulties do not interfere, the entire season's control could be conducted advantageously by this method on all groups of over three trees. One difficulty handicapping such operations, is the necessity of returning to each group treated after 15 days or longer. It is possible that smaller groups would thus be missed and for this reason three or less trees might more profitably be peeled. This method will also necessitate the felling of the trunks in parallel rows so that they can be easily turned. Since it will greatly reduce or even cut in half costs of treatment, the tops could be lopped and brush piled and still be within operating costs of present methods.

Felling Infested Trees. This method consisted of simply felling the trees and allowing them to lie in any position. Since the green leaves permit considerable transpiration for a time and at the same time the water supply from the roots is cut off, the inner bark probably closely simulates condition obtaining in the standing trees. Whatever the reason, results were not very satisfactory.

On the smaller poles cut early in the control work this method seemed to be more effective, provided the poles were felled over the tops of the other treated trees so that they were high off the ground and seasoned rapidly.

Cutting out Infested Length. This method consisted of felling the tree, cutting off the branches, and allowing the trunk to lie close to the ground. The object was to sun-kill the broods on top and produce excessive moisture and fermentation on the under surface. On the standing trees transpiration from the leaves produces normal conditions required by the brood. With the branches removed the moisture is retained. Thorough lopping of all branches without cutting off the infested length should produce practically the same results, though slightly more evaporation would no doubt take place through the thin barked top of the stem. Results were complicated as previously noted. However, on some logs effective mortality was secured, indicating that the method can be used if applied early in the season, particularly if applied in the fall.

This method is still cheaper than turning and will probably be effective for fall and early spring work and as the season progresses turning can be substituted.

It is recommended that if control operations are carried out next spring they be conducted by these methods. The greatest value in such methods lies in the possibility of conducting control work during off seasons when the field force is not occupied with fire duty. At the same time, being very simple, a two or three man crew might accomplish a great deal in holding under control incipient outbreaks.

Summary of Treatments and Results.

Tree no.	D.B.H. Inches	Infested length - Feet	Treatments. Infested length cut off and turned after two weeks sun curing	Tree felled: Infested length cut off and trimmed. Log: On ground	Log: Off ground	Results. Entire log	Upperside	Underside
C 4	10	18	x			100% kill		
" 12	14	34	x			"		
" 6	9	16	x			"		
" 8	9	21	x			"		
A 1	17	40	x			"		
" 2	20	40	x			"		
" 4	12	25	x			"		
G 1	19	35	x			"		
" 3	15	32	x			"		
" 5	16	36	x			"		
" 6	13	22	x			"		
" 9	14	32	x			"		
" 16	16	50	x			"		
F 4	30	50	x			"		
G 7	25	46		x			100% sun kill	Fair emergence
" 12	20	43		x			"	"
" 13	12	36		x			"	"
" 15	14	32		x			"	"
C 1	16	25		x			"	Light emergence
" 3	14	18		x			"	"
A 6	12	25		x			"	"
" 7	20	33		x			"	"
C 5	11	15		x			"	"
A 3	11	25		x			"	"
" 5	12	15		x			"	"
" 8	13	31		x			"	"
" 10	9	20		x			"	"
" 11	15	24		x			"	"
G 10	20	47			x		"	Fair emergence
" 11	20	32			x		"	"
D 1	15	32		x			"	Dried out and killed brood.
" 3	24	46		x			"	Effectively killed by excessive moisture.
B 3	28	38		x			"	Good emergence.
D 4	19	43			base	top	"	Effective wet kill except top end of log.
" 5	10	23				x	"	Fair emergence.
" 6	18	45			x		"	Effective wet kill except top end of log.
" 8	13	36				x	"	" " " " " "
B 1	30	66				x	"	Effectively killed by excessive moisture.
" 2	30	60			x		"	Effective wet kill except top end of log.
F 2	21	40			base	top	"	" " " " " " "
" 4	16	49				x	"	Good emergence.
" 5	14	23			x		"	Effectively killed by excessive moisture.
" 6	30	44			x		"	" " " " " " "
E 1	19	33			base	top	"	Effective wet kill except top end of log.
" 3	18	43				base	"	" " " " " " "
" 4	17	31			x		"	" " " " " " "
" 5	20	41			x		"	" " " " " " "

Eleven additional trees did not contain sufficient broods for examination

Group A treated May 29
" B " " 28
" C " " 27
" D " " 31
" E " " 31
" F " June 3
" G " " 9